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AGRICULTURAL MEMORANDUM NO 527
SIMPLE COMPUTATION OF DEGREE DAYS ABOVE OR BELOW ANY BASE

L D J HARVEY, Meteorological Office
Cambridge

1. The meteorologist, and in particular the agrometeorologist, often requires to know the number of degree days above or below a certain nominated critical temperature. This information is not readily generated by those without access to calculators.

2. Shellard in Professional Notes No 125 uses Thom's formula to provide us with a family of curves for obtaining degree days below 60°F. With very little modification this family of curves can be used for calculating degree days above or below any base (Figs 1, 2 and 3).

3. Thom's formula for monthly values ($\bar{D}$) of:-

a degree days BELOW any base temperature (b) is

$$\bar{D} = N\left[(b-\bar{t}) + 1\sqrt{N}\,\sigma_m\right]$$

and

b. degree days ABOVE any base temperature (b) is

$$\bar{D} = N\left[(\bar{t}-b) + 1\sqrt{N}\,\sigma_m\right]$$

where N = number of days in the month
$\bar{t}$ = average monthly temperature in °F
σ_m = standard deviation of monthly mean temperature and
1 is a parameter obtained from a table of 1 against h where
$h = |b-\bar{t}|/\sqrt{N}\,\sigma_m$

If a family of curves is plotted of $\bar{D}$ against $|b-\bar{t}|$ for various values of σ_m it can be used to obtain the degree days above or below any base, given $\bar{t}$ and N.

4. As a check, the attached curves were used to obtain values of degree days above or below certain bases for some stations quoted in previous Agricultural Memoranda (Nos 201 + 301). The mean temperatures were extracted from Met. O.735, and values of σ_m from the maps given in Professional Notes No. 125. There was a very good agreement of the order of ± 1%.

REFERENCES

DAVIES, J.W., Accumulated degree days below 65°F and 70°F in the south west Region. Ag. memo 201

HURST, G.W., Accumulated Temperatures above 50°F in Southern England Ag. memo 301

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THOM, H.C.S., Normal Degree Days above any base by the Universal Truncation Coefficient. U.S. Weather Bureau, Monthly Weather Review, July 1966.

Met. O. 735 Averages of Temperature for Great Britain and Northern Ireland 1931-60.
Meteorological Office, Bracknell.

Any comments or suggestions on this paper should be referred to the author.

Meteorological Office
M.A.F.F.
Cambridge
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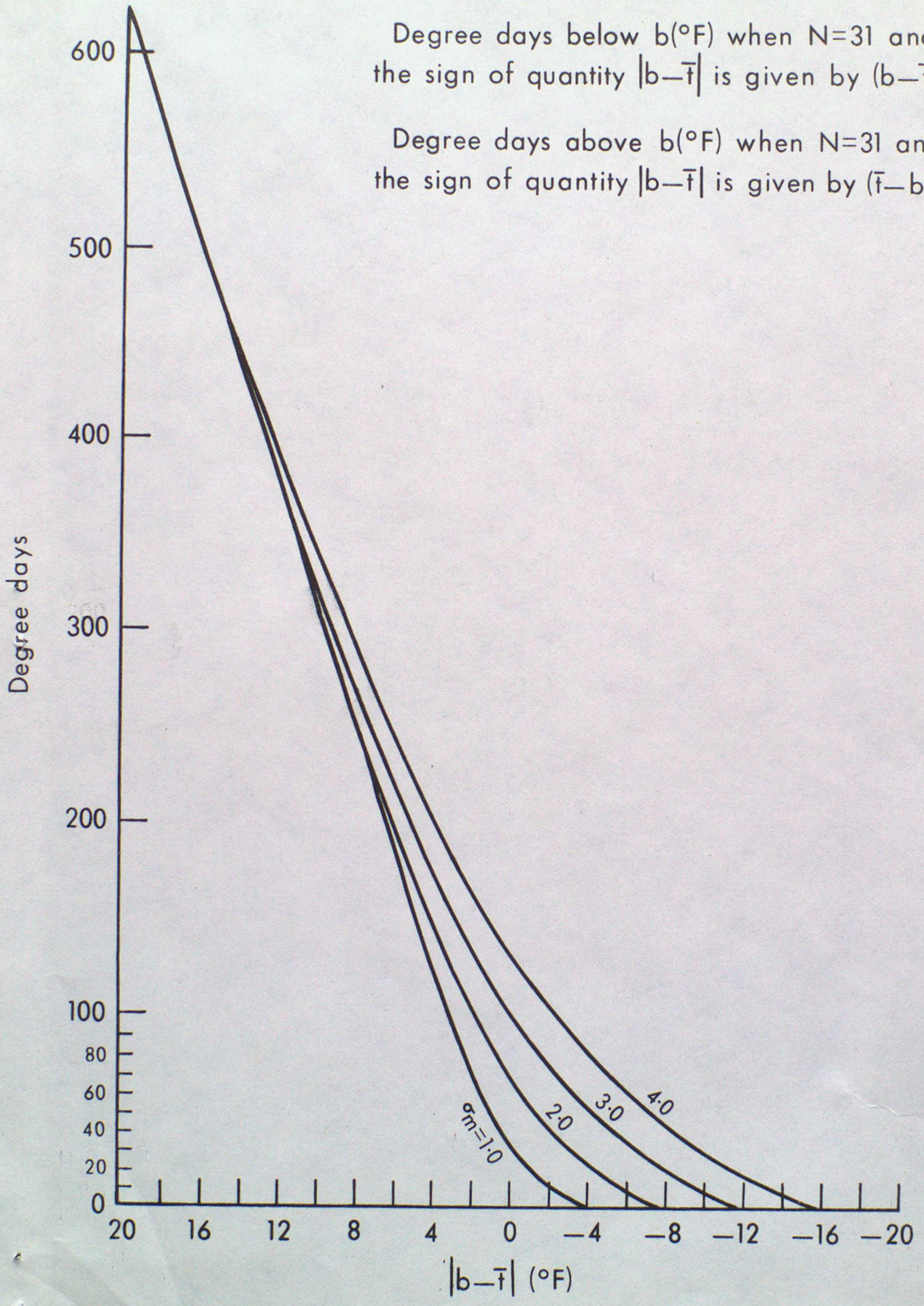
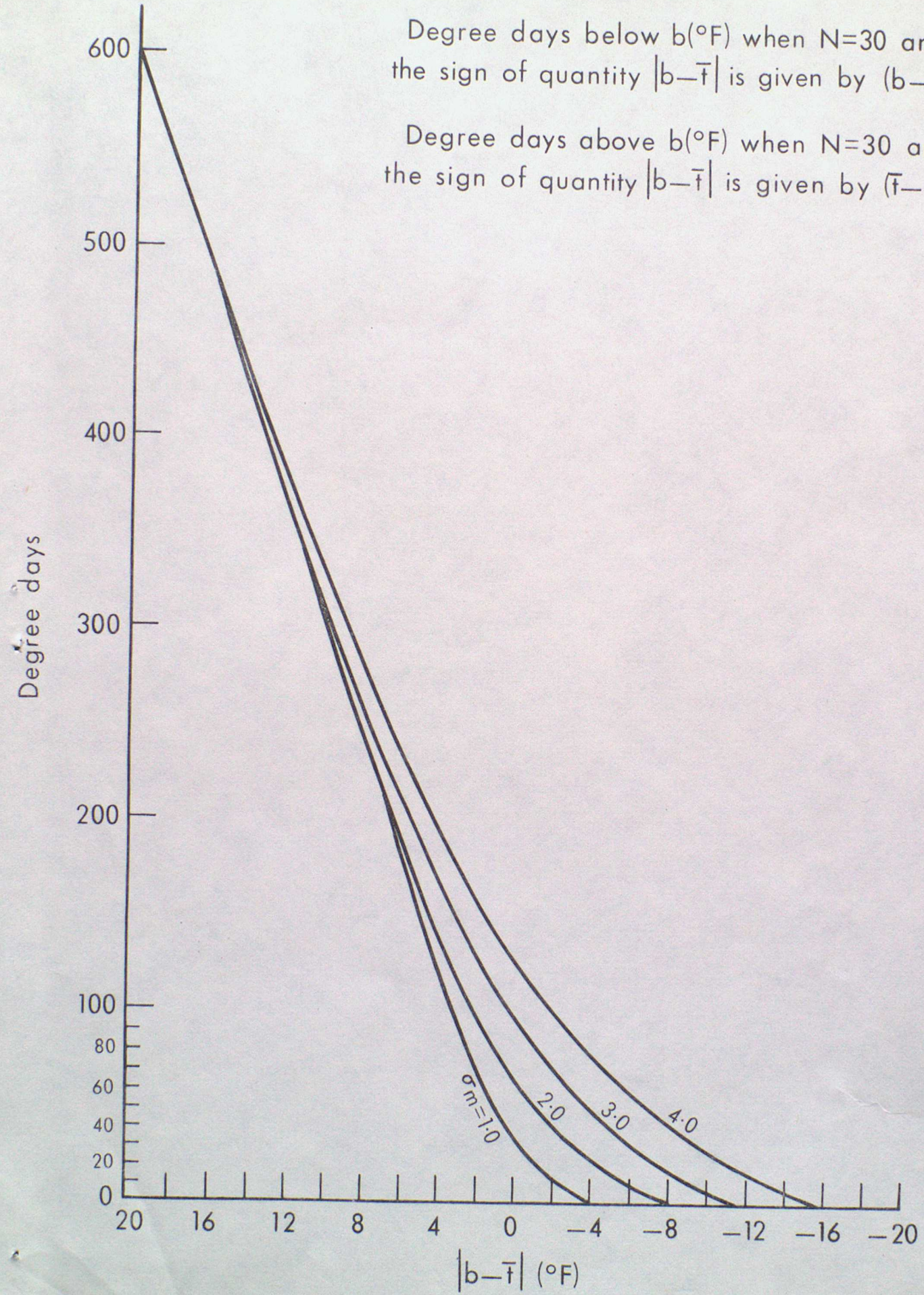
Degree days below b(°F) when N=31 and the sign of quantity $|b-\bar{t}|$ is given by $(b-\bar{t})$

Degree days above b(°F) when N=31 and the sign of quantity $|b-\bar{t}|$ is given by $(\bar{t}-b)$



Degree days below b(°F) when N=30 and the sign of quantity $|b-\bar{t}|$ is given by $(b-\bar{t})$

Degree days above b(°F) when N=30 and the sign of quantity $|b-\bar{t}|$ is given by $(\bar{t}-b)$



Degree days below b(°F) when N=28 and the sign of quantity $|b-\bar{t}|$ is given by $(b-\bar{t})$

Degree days above b(°F) when N=28 and the sign of quantity $|b-\bar{t}|$ is given by $(\bar{t}-b)$